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ABSTRACT

This report describes and summarizes the purposes, activities, major findings, and recommendations of three coal-related study reports: (1) An Assessment of Employment and Training needs for Coal and Gasification Occupations, (2) A Manual for Competency-Matched Instructional Resources for Developing Coal Mining Curricula, and (3) The Preparation and Dissemination of a Manual for Use in Planning Competency-Based Underground Coal Mining Curricula. The first report summary presents information on present and projected labor needs for the coal mining and gasification occupations in Illinois, an assessment of training resources presently available, and recommendations concerning development of additional training programs at the secondary and postsecondary levels. The second report summary outlines the development of a manual of coal mining occupational competencies, rank ordered by a technical advisory group of coal mining experts as to importance for entry-level coal mining curricula. (Each competency was matched with instructional materials for teaching of the competency, and a descriptive listing of the multimedia instructional materials was presented.) The third report describes the conversion of the final report of the second project into the curriculum planning manual for use by local education personnel. (The manual was presented, explained, and distributed in two dissemination workshops.) (JH)

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DEVELOPMENT AND DISSEMINATION OF A MANUAL FOR DEVELOPING COAL MINING CURRICULA

Final Project Report
RD1-C9-170

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In addition, we would like to express again our gratitude to those individuals acknowledged by name in the two earlier reports. Numerous individuals in the coal mining and gasification industries, the UMWA, administrators, faculty and staff of the Illinois community colleges involved in coal miner training, representatives of State and Federal agencies concerned with manpower or regulation of the coal industry and others made valuable contributions of information, instructional/training resources or referrals to other knowledgeable individuals. Project technical advisors who rated the occupational competencies as to their importance for entry-level coal mining curricula are due another special word of thanks. Vocational education personnel at State and local levels shared their experience as well as their curricular outlines with us. Without the cooperation of these and other individuals, our efforts would have proven more difficult and less rewarding.

But especially, for the assistance and guidance we have received throughout the duration of the three coal-related projects from our project manager, Mr. Charles Schickner, we express our deepest appreciation. His help and enthusiastic support have been invaluable.

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INTRODUCTION

This report describes and summarizes the purposes, activities, major findings and recommendations of three coal-related studies conducted by CONSERVA, Inc. for the Illinois Department of Adult, Vocational and Technical Education. The first study, *An Assessment of Employment and Training Needs for Coal and Gasification Occupations*, and the second study, *A Manual of Competency-Matched Instructional Resources of Developing Coal Mining Curriculums*, were fully documented in previous reports (CONSERVA, July 30, 1977 and July 31, 1978). The third study, *Preparation and Dissemination of a Coal Mining Curriculum Planning Handbook*, represented the culmination of the three-phased effort and resulted in the dissemination of the major project product to local education agency personnel through inservice workshops presented by CONSERVA in Illinois. These dissemination activities are documented in this report.

These three projects reflect a coordinated approach for the identification, development and dissemination of products for use by local vocational educators in responding to the changing labor market needs of their local service areas. The first project report presented information on present and projected labor market needs for the coal mining and gasification occupations in Illinois, an assessment of training resources presently available and recommendations concerning development of additional training programs at the secondary and postsecondary levels. The second report outlined the development of a manual of coal mining occupational competencies, rank ordered by a technical advisory group of coal mining experts as to importance for entry-level coal mining curricula. Each competency was matched with instructional materials for teaching of the competency, and a descriptive listing of the multimedia instructional materials including

source, cost, etc. was presented. The description of the activities of the third or dissemination project are included as a part of this Final Report. This phase included the conversion of the Final Report of the second project into the curriculum planning manual for use by local education agency personnel. The manual was presented, procedures for its use explained and distribution accomplished to participants in two dissemination workshops held in Illinois. The final task of the third project was the writing and production of this Final Report.

In order to present the context or background for the aforementioned studies, factual information concerning coal, and especially Illinois coal, is presented in the following section. The potential importance of vast Illinois coal reserves to the U.S. energy situation is noted and the rationale for the three coal-related studies given.

Background

Coal is America's most abundant fuel resource. Four fuels--coal, petroleum, natural gas, and uranium--provide most of the heat and power used today. Coal accounts for more than 60 percent of U.S. fuel reserves and is by far the most abundant of the three fossil fuels, but, as indicated in Figures 1 and 2, less than 25 percent of our current energy consumption is from coal. Whereas our presently known supplies of oil and natural gas are rapidly being depleted at the ever-increasing consumption rate of the past few decades, our reserves of coal are projected to be sufficient for several hundred years to come (National Coal Association, 1978). It is predicted that even the world's oil reserves, on which we presently depend so heavily, will be largely depleted by the year 2020 (Scientific American, 1971). Natural gas, while currently at a peak in its production cycle, will

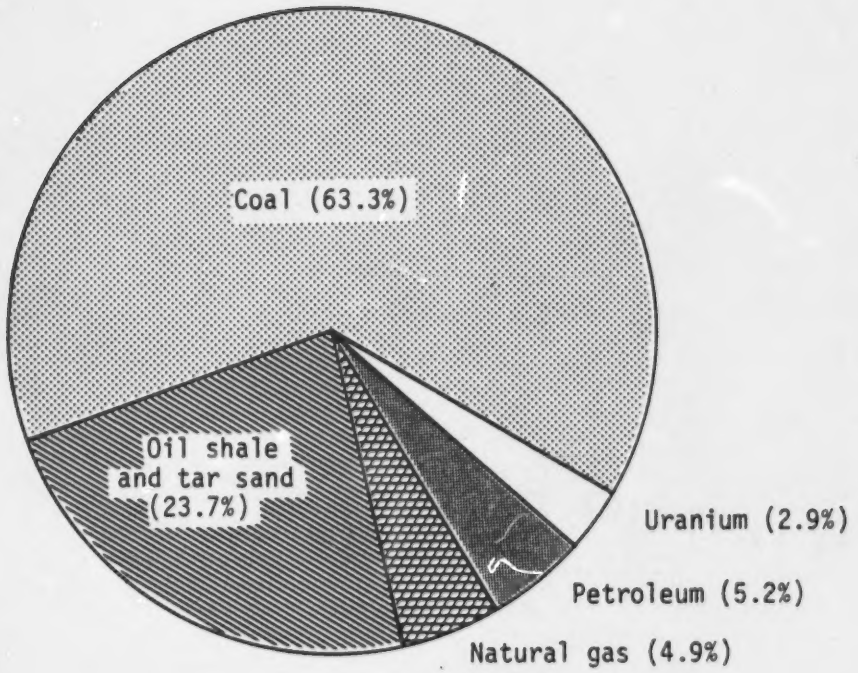

Fig. 1 - Coal in relation to other major sources of energy in the United States. (Source: Federal Power Commission, 1974.)

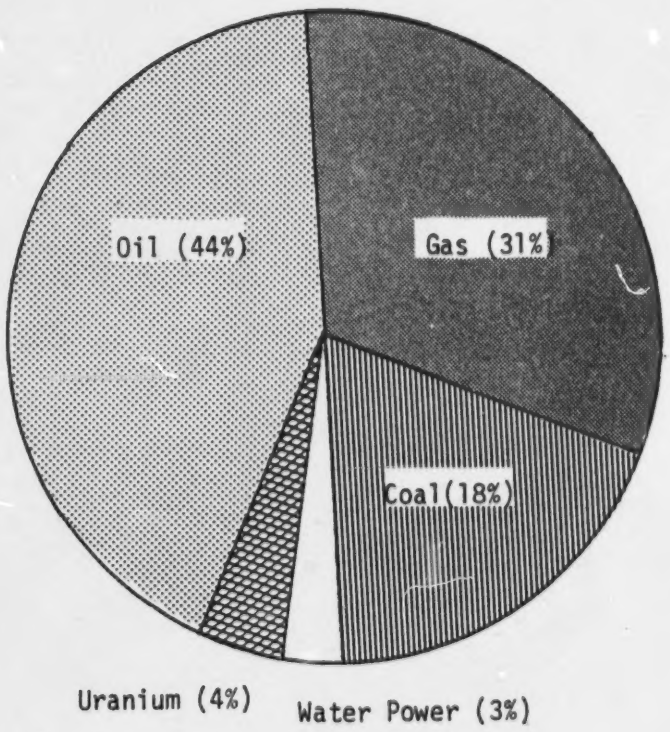

Fig. 2. Current sources of U.S. energy (Source: National Coal Association, 1978)

begin a rapid decline within the next twenty years. Nuclear power, once considered to be the ultimate solution to the world's energy problems, is now being reassessed in the light of environmental safety and health problems related to plant design and construction, and security questions that have recently arisen. Solar energy, although promising in its applications to residential and industrial heating and agricultural applications, is still limited in scope and at best can slightly ease but not solve our dependence on non-renewable energy sources. Coal, on the other hand, is readily available, more easily and economically mined with today's safer and more efficient methods, and not subject to the whims of a cartel of foreign suppliers. As world and domestic oil and gas prices continue to rise, the increased use of coal will become a more and more attractive option in helping to ease America's energy problem.

The State of Illinois, with the second largest identified coal reserves in the nation recoverable using existing mining methods, can play an important role in the provision of coal to lessen the country's dependence on oil. Of the identified reserves in Illinois, 81.2% is minable by underground methods and 18.8% by surface mining methods (U.S. Bureau of Mines, 1974).

Illinois coal production, however, will be influenced by several factors beyond the immediate control of the State or the coal industry itself. Administration attitudes toward increased use of coal have waxed enthusiastic and then waned dramatically several times within the past few years. The coal industry's biggest problem is that environmental laws--in particular the antipollution amendments that Congress added to the Clean Air Act in 1977--have made more difficult both the mining and the burning of coal (TIME, April 2, 1979). The amendments require, among

other things, that new coal-fired plants install highly complex and expensive scrubbers to remove up to 85% of sulphur pollutants from exhaust smoke. Since most Illinois coal contains relatively high concentrations of sulphur, the scrubbers are necessary for the utilization of this coal within Environmental Protection Agency standards. Nevertheless, even taking these factors into account, the fact that coal is plentiful, accessible and usable in various forms--solid, liquid and gas--should bring about its greater utilization as the oil and gas supplies dwindle or are priced out of the market.

The 1977 National Energy Outlook, prepared by the Federal Energy Administration, projected that Illinois coal production, under a "cleaner coal, less nuclear scenario" would reach 95.287 million tons by 1985 (FEA, 1977). This scenario is structured to show the impact of a combination of circumstances that could occur, largely as a result of environmental and safety concerns, which could substantially increase demand for coal. The circumstances or assumptions include severely limited construction of new nuclear power plants and the prohibition on the burning of oil and gas by utilities, thus greatly increasing demand for coal. If, in addition, scrubbers are required on all coal power plants, regardless of the sulphur content of the coal used, low-sulphur western coal would lose its economic advantage over high-sulphur eastern coal. Proposed legislation requiring reclamation and restoration of strip-mined lands to their "approximate original contour" would substantially increase the cost of surface mined western coal. These factors will greatly affect the future of the coal industry in Illinois.

A study by the Illinois State Geological Survey (1976) has projected that there will be an average growth rate of 4% in the demand for Illinois coal

from 1980 to 1985, resulting in a production figure of 93.3 million tons by 1985, slightly lower than that projected by the FEA. Illinois coal producers, in a survey of the development and expansion plans of the coal industry conducted by Keystone Coal Industry Manual in January, 1977, indicated a planned capacity of 38.4 million tons to come into production by 1985. In order to meet the expected demand by 1985, Illinois productive capacity would have to be expanded 22.45 million tons beyond that currently planned.

This expansion of production would bring with it a concomitant need for an expanded workforce of both experienced miners and new hires into the industry to replace miners lost by attrition, death, retirement, etc. It is to the training of the numbers of entry-level miners who will be needed that Illinois vocational educators can address themselves.

Purposes of the Projects

Recognizing the implications of a turn to energy sources that would lessen our dependence on oil and responding to an acknowledged need for information concerning (1) the employment and training needs for coal mining and coal gasification occupations in Illinois, (2) the resources necessary to meet those requirements, and (3) the training necessary to develop the human resources needed to meet the manpower demands of the industry, the Department of Adult Vocational and Technical Education (DAVTE) issued RFPs for studies to gather the pertinent data and to develop appropriate materials for the development of entry-level coal mining curricula in Illinois. Over a period of time extending from September 1976 to June 1979, CONSERVA, Inc. was awarded three contracts: (1) to assess the employment and training needs for coal mining and coal gasification

occupations in Illinois, (2) to develop a manual of competency-matched instructional materials for developing underground coal mining curricula at the secondary level, and (3) to commercially reproduce and disseminate the above manual and supportive information to LEA personnel through diffusion workshops in southern Illinois.

This present document represents an overall Final Report summarizing the activities of the two preceding coal-related projects and reporting the activities performed during the third, or dissemination phase of the work.

PROJECT SUMMARIES

An Assessment of Employment and Training Needs for Coal and Gasification Occupations

Six broad sectors thought to impact on manpower and training requirements and resources in the coal and gasification industries were the focus of the first study. The sectors included the: (1) Industrial Sector, (2) Labor Sector, (3) Public Enforcement Sector, (4) Public Education Sector, (5) Auxiliary Sector, and (6) Private Sector. Representatives of each sector provided input data through personal interviews, telephone interviews and personal correspondence. They also provided written documentation in the form of technical regulations, booklets and pamphlets.

Following initial research efforts in the Industrial Sector, it was found that a recent survey to determine manpower needs had been conducted by the Illinois Basin Coal Mining Manpower Council with a subsequent report prepared in conjunction with the Governor's Advisory Committee on Coal Manpower (1975). A re-survey of both large and small underground and surface mine operations was considered unnecessary after extensive discussions by CONSERVA staff members with coal industry officials involved with the Basin study and careful review of the survey results. With the permission of the Project Monitor, coal industry data collection procedures were modified. However, the single operating pilot gasification site in Illinois, the Hygas Plant in Chicago, was visited and plant officials were personally interviewed concerning projected manpower and training needs for the coal gasification industry.

Estimated Manpower Requirements in the Coal Mining Industry

Project research efforts to identify the major occupations in the coal and gasification industries included reviews of (1) the current UMWA contract, which lists over 1,000 job titles classified by type of mine (underground and surface), (2) the Standard Occupational Classification (SOC) manual developed by the Office of Management and Budget, which reports in unit groups or clusters of occupations with similar work activities, (3) the Dictionary of Occupational Titles, and (4) the Illinois Coal Basin Mining Manpower survey and report. It was concluded that the twelve job categories for underground mining and the thirteen categories for surface mining which were used in the Basin survey were the most appropriate for use in carrying out the purposes of this study.

A listing of the major occupations in the coal gasification industry was provided by officials of the one operating commercial coal gasification plant in Illinois, the Hygas Plant in Chicago. Discussions were also held with staff members of an experimental coal gasification project at North Carolina State University in Raleigh to request their input concerning the major occupations required by the gasification industry.

Projected Employment Requirements. Projected employment requirements (ER) were computed from projected tons per year production (TP) and employee productivity (EP) according to the relation ER = TP/EP and classified according to type of mine (deep or surface) and age of the productive capacity (old or new). Current productivity data were considered as the best estimate of 1985 productivity due to the fact that improved extraction technology is expected to be offset by decreases caused by more stringent health and safety requirements and possible unauthorized work stoppages.

Based on the foregoing estimates, it was estimated that a labor force of 19,187 will be required in 1985 to produce the 93.3 million tons of coal expected to be demanded. Using 1975 employment figures for underground mines and surface mines, the projections were that 5,541 new employees--4,810 in underground mining and 731 in surface mining--would be required due to growth and approximately 2,400 (total) would be needed due to replacement. A much greater percent increase (>50%) is shown by underground mining as compared with that for surface mining (18%).

A short discussion pointing out the disparity between CONSERVA's estimates of total employment requirements for 1975-1985 and those from the Illinois Basin survey was presented and several possible reasons for the differences were offered.

Projected Occupational Requirements. Projections were made of occupational requirements for both underground and surface mines. For underground mining, the largest employment requirement was for machine operators (44% of the total requirement); and similarly, for surface miners, the largest employment need was for equipment operators, but at only 18% of the total estimated requirement projection. When grouped in broad categories of underground mining occupations, the supervisory, managerial and professional occupations accounted for 15% of the total manpower needs; technical occupations accounted for 1%; clerical occupations for 2%; skilled occupations for 62%; semi-skilled occupations for 6% and unskilled occupations for 14%. For surface mines, however, supervisory, managerial and professional occupations accounted for 26% of the total manpower needs, technical occupations for 8%; clerical occupations for 5%; skilled occupations for 45%; semi-skilled occupations for 9% and unskilled occupations for 7%.

Estimated Manpower Requirements in the Coal Gasification and and Liquefaction Industry

The Hygas Plant in Chicago, a pilot plant for research and development efforts utilizing the Hygas process, was the only gasification and/or liquefaction facility in operation in Illinois at the time of the first CONSERVA study. Plans for three additional coal gasification demonstration plants were being drawn.

Occupational Employment Requirements. A staffing chart for a coal gasification plant of 250 million SFC/day capacity was provided by officials of the Chicago Hygas Plant and was used by CONSERVA to project the estimated employment requirements to 1990 with increases shown due solely to growth. The National Gas Survey, prepared by the U.S. Federal Power Commission (FPC, 1975), reports projections by the Supply Technical Advisory Task Force--Synthetic Gas-Coal Group indicating that by 1990, two commercial coal gasification plants are expected to be in operation in Illinois.

Training Requirements

Training requirements for coal mining occupations include those requirements which are contractually specified as well as those which have evolved through informal customs and practices in the coal mining industry. Awarding of jobs on the basis of seniority, mandatory orientation programs for newly hired inexperienced or experienced miners, annual retraining programs for each miner and job-specific briefings when a miner changes jobs are examples of mandatory or customary practices in the coal mining industry.

Additional training requirements are set by legislative requirements under the Illinois Coal Mining Act. These requirements include the obtaining of a certificate of competency from the Miners' Examining Board and having completed a course in first aid and mine rescue techniques before being employed in a job at the coal face. One year of previous experience is part of the qualification for issuance of a first class certificate. An Associate in Applied Science Degree or an engineering degree from an approved school, college or university reduces the experience requirement by six months.

Beyond those training requirements imposed by the UMWA contract, industry customs and practices, and State regulations, there are Federal regulations that require additional training for newly hired, inexperienced and experienced underground miners and miners assigned to new work duties. There is also an extension of the period for annual retraining for each employee. Specific information on types of training required and length of training periods were presented. Cost projections for these training requirements were computed for the period 1976-1985. A discussion was presented concerning estimates of training requirements for the production workforce, the technical workforce, and the management and professional workforce.

Training Resources

Training resources were classified and described according to the sectors originally introduced as impacting on manpower and training requirements and resources in the coal and gasification industries.

Industrial Sector. In the coal mining industry, on-the-job training has always been valued as a training method, and under the 1974 UMWA Contract the provision of assignment of full-time helpers to most continuous miner operators, roof bolting machine operators and other positions has essentially formalized the system. Some companies, however, have encouraged employees to enroll in courses at public schools and colleges. Others have developed their own formal training courses. Training is also being provided on-site or in-plant as a customer service by several mine machinery manufacturers.

Public Enforcement Sector. Instruction is provided semi-annually at sites throughout the State of Illinois by the Safety Training Division of the Illinois Department of Mines and Minerals. Miners are trained in the safety aspects of coal mining, and classes are attended primarily by those seeking certification as mine manager, mine examiner, hoisting engineer or State mine inspector. Examinations are given at the end of the course. Statewide annual enrollment ranges between 700-1,000 participants.

Certified MHSA (formerly MESA) instructors and "cooperative instructors" trained by the Chicago Training Center of the Mining Health and Safety Administration offer over 100 courses which are conducted throughout Illinois. Course lengths vary from one to ninety instructional hours with approximately one-third exceeding 10 hours in length.

Public Education Sector. Educational resources presently available for coal miner training in Illinois include programs at three community colleges--Rend Lake, Wabash Valley, and Southeastern--which are mandated by the Illinois Community College Board to offer a coordinated cooperative program in coal mining technology leading to the Associate in Applied Science Degree.

The three community college districts share a common advisory board and generally share facilities, instructional offerings, faculty and students (Swalec, 1976). In addition, John A. Logan College and Wabash College have an interdistrict agreement to offer the Certificate and Associate Degree in coal mining technology as a cooperative venture.

The focus of Rend Lake Community College's mining program is the preparation of maintenance and repair personnel. Southeastern Illinois Community College offers a program of core courses in mining and related work primarily for presently employed miners seeking to upgrade their skills, and emphasizing the areas of mine management and supervision. Wabash Valley offers a program designed to prepare entry-level miners for repair and maintenance activities. Major pieces of mining equipment have been donated by local mining companies, and courses in electrical maintenance, hydraulics and orientation have been offered to local mining firms on an as-requested basis.

In addition to the training offered by the community colleges, both the University of Illinois at Urbana-Champaign and Southern Illinois University at Carbondale offer programs in mining leading to the Bachelor of Science degree. The University of Illinois program is a mining option in the General Engineering Program, and Southern Illinois University offers its degree program in Industrial Technology with specialization in Mining Technology (Besterfield, 1976).

At the time the research for the first project began, there was only one experimental program in land reclamation being offered at the secondary level in Illinois. There are now several programs offered at the high school level in both underground and surface mining.

Private Employment Sector. Training programs or courses for miners or prospective miners are offered by several companies which manufacture mining machinery. Most of the training materials developed by these companies are related to specific pieces of equipment which they manufacture. The instructional programs can include course outlines, instructors' and students' materials and often audiovisual presentations. Training courses are offered both on-site at the mines and at the manufacturers' plants. In addition, company representatives have assisted numerous vocational schools and colleges in curriculum development.

Recommendations

Six policy-oriented recommendations were offered for consideration by the Illinois State Board of Education and, where appropriate, by the Illinois Community College Board. They included:

1. the adoption of a policy by the State Board of Education that encourages development of vocational programs at the secondary level to prepare students for entry-level jobs in the Illinois coal industry;
2. the provision of assistance to local education agencies wishing to develop a coal mining curriculum;
3. the adoption of a policy by the Illinois Community College Board directing that further expansion of presently offered coal mining courses be by inter-district agreements with the colleges now offering those programs;

4. the adoption by the State Board of Education, the Community College Board and the Board of Higher Education of a policy that encourages articulation between secondary and postsecondary institutions providing coal mining training;
5. the constitution of the Illinois Basin Coal Mining Manpower Council as an education-industry cooperative committee charged with advisory responsibility for all State supported coal mining programs;
6. that the State Board of Education not seek at this time to establish or approve vocational training programs in coal gasification because of insufficient anticipated demand in the near to immediate future.

A Manual of Competency-Matched Instructional Resources for Developing Coal Mining Curricula

The second coal-related contract awarded to CONSERVA by the Department of Adult, Vocational and Technical Education was a logical follow-up of the recommendations concerning secondary level coal mining curricula made at the conclusion of the study assessing employment and training needs for coal and gasification occupations in Illinois.

To aid in the development of secondary level coal mining curricula, CONSERVA, Inc. proposed to produce a manual of competency-matched instructional resources which could be used by curriculum planners and vocational instructors. The manual would provide: (1) a prioritized listing of coal mining competencies (validated by an advisory panel of persons knowledgeable of coal mining and education); (2) a descriptive inventory of

commercially available and some privately developed instructional/training resources including sources and costs; (3) a cross-matching of the competencies with each of the training materials/resources; and (4) a procedure for use of the manual in the development of secondary level, competency-based coal mining curricula.

Project activities were organized into six major tasks:

- Constitute a Technical Advisory Committee consisting of representatives of the coal mining industry, the United Mine Workers of America, State and local education agencies and other relevant State agencies;
- Review existing coal mining curricula and published task analyses in order to identify a list of occupational competencies necessary for coal mining occupations;
- Validate occupational competencies through a review by the Technical Advisory Committee;
- Identify existing coal mining instructional materials in both the public and private sectors;
- Cross-match instructional materials with occupational competencies validated earlier;
- Assemble and produce the manual and the final project report.

Representation on the Project Technical Advisory Committee was sought from the mine operators of Illinois; the United Mine Workers of America, District 12; the three Illinois Community Colleges offering coal mining technology programs; the Illinois Basin Coal Mining Manpower Council, the

Illinois Department of Mines and Minerals; the Governor's Office of Manpower and Human Development; officials and training personnel of mining companies active in Illinois; vocational education directors at the (local) Unit level; personnel from university mining extension departments in other coal mining states; and publishers of coal miner training materials.

In order to identify and compile a comprehensive listing of occupational competencies of possible importance to entry-level coal miners, numerous contacts were made with knowledgeable individuals who were either conducting vocational training programs for miners, planning curricula for miner training, or who were experienced mining personnel with close contacts to the mining industry and its operations. State and Federal regulatory agencies were contacted for information concerning mining safety and health curricular materials. Representatives of large and small mining companies were asked about the availability of company-developed training programs and the competencies they encompassed. Educators involved in mining-related programs at the university level in several coal-mining states provided instructional materials and curriculum requirements for their programs. State level vocational education personnel knowledgeable of coal miner training provided outlines of existing secondary curricula and referrals to other knowledgeable individuals. Community college mining deans, department heads and instructors made valuable suggestions, provided lists of instructional materials used and referrals to sources of materials. Finally, instructors from several states who were currently teaching miner preparation courses at the secondary level sent outlines of their programs for our information.

From careful study, analysis and synthesis of the information collected from the above sources, project staff distilled a listing of 115 competencies of potential importance for entry-level coal mining. Those competencies were

presented to the Project Advisory Committee as part of a rating instrument for use in identifying competencies of greatest importance.

Because of the coal strike in 1978, the Advisory Committee did not meet as a group, but they did fulfill their intended purpose in project activities by completing the instrument requiring an importance rating of each occupational competency listed for entry-level coal miner training at the secondary level. Each competency was rated: (1) of little or no importance, (2) of moderate importance, or (3) of major importance to entry-level coal mining. In addition, Committee members made a judgment for each competency listed as to whether students should receive (a) basic introductory instruction, or (b) in-depth instruction on that competency. As a result of the rating procedure, sixty-four occupational competencies were identified by the Advisory Committee as being of moderate or major importance for inclusion in a secondary level curriculum. Table I was presented listing occupational competencies ranked in order from those receiving highest priority ratings to those considered of little or no importance for entry-level coal mining.

Summary of Competencies Rated as Important for Entry-Level Coal Mining

Those competencies rated as being of major importance for entry-level coal mining included general employability skills such as good attitudes and work habits, ability to follow directions, and cooperation with others. The subject of safety,including avoidance or prevention of accidents and proper reaction and response in case emergencies or accidents do occur, was considered particularly important to coal miners. Also included under the subject of safety were those competencies involving proper use and care of personal equipment and tools and knowledge of procedures for escape or self-rescue in case of mine fires, explosions, or other emergencies. The ability

to perform various types of lubrication jobs was rated highly, as was the knowledge and understanding of basic coal mining terminology. The competencies involving knowledge of basic roof and rib control systems and the detection of hazardous roof conditions received ratings of major importance. Mining laws, rules and regulations at the Federal, State and local levels as well as the management/labor structure of the coal mining industry received high importance ratings for entry-level coal mining. A group of competencies involving mine gases, their identification, detection, and associated hazards was rated as being of major importance.

Competencies felt to be of moderate importance for entry-level miners include those involving mine ventilation, including mine maps; the technical development, methods and economic impact of coal mining; knowledge of methods of transportation (haulage) of coal; ability to make minor adjustments or repairs to mining machinery and equipment; and an understanding of the fundamentals and functions of major pieces of mining machinery and equipment.

Development and Organization of Tables

The occupational competencies validated by the ratings of Project Advisory Committee members had been classified into two types: (1) Knowledges/Understandings, or (2) Abilities/Skills. In a thorough, methodical procedure, each competency was matched with every instructional/training material containing information concerning that competency. Table II, listing the competency statement followed by numbers, each referring to a particular document, audiovisual aid, or other type of instructional material, was then developed. By referring to the numbered listing of materials, instructional resources could be identified for any combination of occupational competencies chosen for a local school's needs in a coal mining curriculum.

The information in Table II was presented in a different format as Table III, listing each instructional/training resource by name, followed by numbers representing each occupational competency covered by the material in that particular instructional resource. Curriculum planners, instructors or advisory committee members could use the third Table to determine the scope of information contained in each instructional/training material, and were thereby provided another decision dimension for choosing appropriate curriculum materials.

Table IV was presented as an inventory of available instructional/training materials listed by source, described as to type (textbook, workbook, programmed learning material, audiovisual material, reference or teacher resource document, etc.) and including cost, if any. Materials were grouped into three major types: (1) classroom materials for student use; (2) audiovisual aids; and (3) miscellaneous resource materials for teacher and student reference.

The inventory of relevant instructional/training materials evolved from input from many of those knowledgeable individuals who were contacted concerning occupational competencies. In addition, representatives of professional mining organizations, federal agencies having to do with mining, the UMWA, mine machinery manufacturers, publishers of educational textbooks, publishers of encyclopedias, audio-visual producers and distributors, the Director of Educational Services of the National Coal Association, officials of major mining companies, and others either recommended materials, made referrals to additional sources, or contributed materials to the collection. A rather extensive collection of these instructional materials and audiovisual aids was purchased and turned over to DAVTE at the conclusion of the project.

Procedures for Use

Four Tables were developed as a part of the Manual of Competency-Matched Instructional Materials to aid planners of secondary level underground coal mining curricula. A four-step procedure was then outlined for utilizing the Tables in curriculum planning. The steps are as follows:

Step 1: Identify competencies to be included in the coal mining curriculum;

Step 2: Identify instructional materials available for use in teaching the competencies selected in Step 1;

Step 3: Match instructional/training materials to competencies they cover in order to determine which materials are best suited for teaching of the competencies identified in Step 1;

Step 4: Make final selection of instructional/training materials to be used in the secondary level coal mining curriculum for entry-level miners.

In Step 1 of the planning procedure, it was suggested that a Mining Curriculum Advisory Committee be established and include representation from local mining companies. After the goals of the curriculum are outlined, these mining personnel can help to identify the needs of their companies for new miners and the competencies which those miners should possess. This involvement and input will help to ensure that the training provided to students is consistent with local hiring preferences or requirements and it may also serve to facilitate the future placement of students into mining occupations.

After determining what the local needs are, what resources are available in the way of instructional staff, facilities and equipment for a mining curriculum, and deciding how much instructional time will be given to such a curriculum, discussions between local vocational education personnel and Advisory Committee members should begin concerning which competencies they feel

should be taught. It was suggested that Table I be used as a starting point for this discussion since it lists the occupational competencies ranked (by the Project Advisory Committee) as to their importance for entry-level coal mining. Local priorities may be the same or may differ somewhat from those listed in Table I.

Once the important competencies have been tentatively identified, each should be considered in light of the instructional skills, equipment and facilities which would be necessary for providing instruction. Consideration must also be given to the time required to teach the identified competencies. Here again, Advisory Committee members may be able to provide estimates of instructional time needed, and school personnel can temper those estimates based on their knowledge of student capabilities. Competencies chosen should lead to those goals and objectives previously determined for the curriculum. At this point instructional materials appropriate for teaching the competencies will need to be identified.

Step 2 was stated as the identification of appropriate instructional/training materials. This step should involve the competency-to-materials match in Table II and the inventory of available instructional materials in Table IV. The types of materials chosen should reflect the mode of teaching, e.g., lecture, discussion, demonstration, field trip, lab or shop work, etc. Another aid to identification of appropriate materials was suggested as being the purpose for which the material was intended, e.g., introduction, overview of the subject, reinforcement of classroom presentation, etc. A further consideration was stated as the estimated time considered necessary to teach the competency. Some materials might present information in too much detail or depth, and some may not give enough information.

Table IV was presented listing available instructional materials grouped into four major categories: (1) those primarily for classroom/student use; (2) those classified as audiovisual aids; (3) those considered mainly as student and teacher reference materials; and (4) miscellaneous materials relating to coal and miner training.

By considering the points suggested, appropriate materials could be tentatively selected for teaching each of the previously chosen competencies. However, several further considerations were suggested that could aid in making the final decisions as to purchase of materials.

Step 3 presented the further decision dimension of scope of coverage of each competency for each material listed. Table III listed each instructional material by title, followed by the numbers representing every competency covered by that material. Some textbooks, for instance, cover a number of the competencies, whereas, for example, a booklet from MESA (MSHA) might cover only one topic, but in greater depth of information. The important observation to be made is how well the material covers the competencies chosen earlier. The result of Step 3 was stated as being a carefully determined listing of materials chosen for further, in-person review, selection and purchase.

Step 4 outlined the completion of the final selection of instructional/training materials to be used in the secondary level coal mining curriculum for entry-level miners. In-person inspection of materials was recommended highly because it allows for an evaluation of the format, the reading level, the complexity, the coverage or depth of the materials, the appropriateness of the materials within curriculum needs and time constraints, and the compatibility of the materials with goals of instruction.

The rather extensive collection of instructional materials purchased during the project and turned over to DAVTE is now available for review and inspection at the

East Central Curriculum Coordination Center
Professional and Curriculum Development Unit
Department of Adult, Vocational and Technical Education
100 North 1st Street
Springfield, Illinois 62777
(217-782-2827) Contact: Rebecca Douglass

If an in-person review is not possible, however, the procedures outlined in the steps above were recommended as the best alternative for local education agencies to follow in choosing appropriate materials. By following the recommended steps and suggestions, planners will be able to develop coal mining curricula which are in accord with local needs and resources using materials which are most appropriate in light of the competencies they wish their students to develop.

The Preparation and Dissemination of a Manual for Use in Planning Competency-Based Underground Coal Mining Curricula

The final product of the second coal mining-related project carried out by CONSERVA, Inc. for the Illinois Department of Adult, Vocational and Technical Education was a manual of competency-matched instructional materials for developing coal mining curricula. The manual was presented in the format of a final report of a research project--including a discussion of project methodology, procedures for the development of the four Tables making up a major part of the report, and the inclusion of the rating instrument used by the Project Advisory Committee members to rank the importance of the occupational competencies for entry-level coal mining. The document was in

typed form and contained no graphic presentations of data related to Illinois coal reserves, mining workforce, or production statistics.

CONSERVA was requested by DAVTE to convert the Final Report into a commercially printed document (or Manual) organized for easy use by local educational agency personnel, illustrated with appropriate graphic figures or charts and without extraneous information concerning project methodology or activities. In addition, the Manual, along with supportive information, was to be disseminated to LEA personnel through workshops to be conducted by CONSERVA in southern Illinois. The workshops provided the means for (1) distribution and explanation of the use of the Manual to interested LEA representatives; (2) inspection by workshop participants of a representative sample of the large number of instructional/training materials gathered and/or purchased during the course of the project, and (3) explanation to participants of the potential role which secondary level vocational education can play in preparing individuals for entry into coal mining occupations.

Project activities in the preparation and dissemination of the Manual for use by local educational agency personnel in the planning of secondary level coal mining curricula were organized into four major tasks. The tasks were as follows:

(1) revise the existing Final Report of contract #RDI-B8-551 into a format more usable by LEA personnel,

(2) plan and arrange for dissemination workshops to be conducted by CONSERVA in southern Illinois,

(3) conduct workshops and distribute Manuals and supportive information to workshop participants,

(4) prepare a project Final Report summarizing the activities performed during the dissemination phase as well as those performed in the two earlier coal mining projects conducted by CONSERVA for DAVTE.

Revision of Final Report of Second Project

In order that the Manual of Competency-Matched Instructional Materials would prove of maximum interest and utility to local education agency personnel considering the establishment of curricula for underground coal mining, several revisions needed to be made in the Final Report of contract #RDI-B8-551.

The textual material was reorganized into more easily readable two-column type. In order to highlight their importance, major headings, sub-headings and key words, phrases and sentences were printed in bold-face type. Graphic illustrations were added showing (1) the distribution of identified coal resources and reserves in the 12 leading States; (2) coal production in millions of tons in Illinois in 1975 and projections for 1985; and (3) the coal mining labor force in Illinois in 1975 and the projected increase by 1985 indicating needs for new hires and replacements.

Descriptive and explanatory information concerning each of the four Tables included in the report was relocated so it would immediately precede the Table to which it referred. Additional listings were included of those instructional materials which had been received following the production of the project Final Report.

The Project Methodology section which outlined steps taken by CONSERVA staff in carrying out project activities was deleted from the final version of the Manual. The copy of the rating instrument used by Project Advisory

Committee members to indicate the importance of competencies for entry-level coal mining was also deleted. A listing of the names of almost sixty resource individuals contacted by project staff for information was not included in the final publication. The document was then taken to a commercial printing establishment, printed and bound with a professionally designed cover supplied by DAVTE.

Dissemination Workshops

After consultations with the Project Monitor, it was decided that CONSERVA should conduct two dissemination workshops, one in Mt. Vernon and one in Springfield. Immediately, arrangements for meeting room facilities were made for the Holiday Inn in Mt. Vernon and the Forum 30 in Springfield.

An invitation was extended by letter to local education agency personnel in southern and southeastern Illinois utilizing mailing labels supplied by DAVTE. An outline of topics to be covered at the workshop and other general information pertaining to schedule, location and sponsoring agency was included along with a registration form to be completed and returned by each prospective workshop participant. Registration forms were returned indicating which workshop the individual would be attending. Twenty-three registration forms were received for the Mt. Vernon workshop and thirteen for the workshop in Springfield. Examples of these materials are included in the Appendix.

Charts graphically depicting information concerning location of Illinois coal mines, current and projected Illinois coal production, and current and projected Illinois mining labor force requirements were designed and produced by a professional graphic artist. Folders of supplementary information for each workshop participant were requested and received from the National

Coal Association. A copy of the rating instrument used during the project was also prepared for each participant.

A representative sample of the collection of available instructional/ training materials relating to coal mining and miner training was assembled and sent to Illinois for display at both workshops. The film "An American Asset" was chosen to be shown as an example of the excellent audiovisual materials available concerning coal mining. Examples of coal mining instructional slide-tape presentations were also chosen to be shown as appropriate for secondary level coal mining programs.

The first workshop was held on Monday, May 14 at the Holiday Inn of Mt. Vernon with fourteen participants plus two CONSERVA staff members in attendance. Following introductory remarks and a presentation of information concerning the potential importance of Illinois coal and the role that vocational education can play in the training of entry-level coal miners, discussions of participants' experiences in attempting to set up coal mining curricula or questions from those interested in implementing such a curriculum provided for a lively interchange of ideas. The representative from DAVTE was able to answer several pertinent questions concerning topics such as instructor certification and funding of the proposed curricula and to give promise of encouragement and support from his office for curriculum development efforts. He also explained the future location of the materials assembled during the project and the opportunity for review or use of books, films, etc.

During the afternoon of the workshop the Manual was presented and explained, and its use in planning a coal mining curriculum was outlined. Several excellent instructional films and slide-tape programs were shown, and participants were able to inspect the large display of instructional materials. Further discussions between participants and with CONSERVA staff provided additional information concerning curriculum development activities.

The Springfield workshop was held at the Forum 30 on Tuesday, May 15. There were only six LEA participants plus three representatives of the Department of Adult Vocational and Technical Education and the two CONSERVA staff members, but every participant joined in discussions concerning the prospects for and the difficulties faced in setting up a coal mining curriculum. The general format for the presentation of information was the same as for the Mt. Vernon workshop, but in response to comments made on Mt. Vernon workshop evaluation forms, the introductory material was shortened considerably so that the participants would have more time to examine the Manual, raise questions and bring up any problem they perceived or had faced in their curriculum planning. Issues of concern were stated as: funding for the new curriculum, certification requirements for instructors, State-level reaction to the structure of the curriculum using modules of instruction from existing programs, e.g., welding, major metal working, etc.

Brief workshop evaluation forms were completed by participants. The forms included questions concerning the helpfulness of the workshop in planning or implementing a coal mining curriculum, the adequacy of presentation of the Manual and other materials, and the likelihood that participants would use the information in establishing a coal mining curriculum. In addition, suggestions for improving any subsequent workshops were requested (and immediately implemented at the next day's workshop in Springfield). Responses were very positive as to the helpfulness and value of the workshop. A copy of the evaluation form showing percentages for all responses is presented on the following two pages.

Date _____

ASSESSMENT OF WORKSHOP AND CONFERENCE
on
COAL MINING OCCUPATIONS
in
SECONDARY VOCATIONAL EDUCATION

1. Prior to this conference, had you considered offering a coal mining curriculum?

71% Yes 29% No ___Other; (please explain) _____

_____

2. To what extent has this workshop been of assistance to you in planning or in implementing a coal mining curriculum?

47% Very Helpful 33% Helpful 20% Somewhat Helpful ___Not at All Helpful

3. Was sufficient general information on coal mining provided for you?

60% Yes 40% Moderately So ___No

4. To what extent do you feel confident that you can utilize the Manual to aid in organizing and putting into operation a coal mining curriculum?

27% Very Confident 60% Confident 13% Moderately Confident ___Not Confident

5. Were the "Competencies" as listed in the Manual adequately discussed, in order for you to engage in curriculum planning?

80% Yes 20% Moderately So ___No

6. Were the "Instructional Materials" adequately described, in order for you to engage in curriculum planning?

87% Yes 13% Moderately So ___No

7. From your examination of the sample instructional materials (films, slide-tape programs, publications, charts, etc.), to what extent do you expect to utilize the available materials in organizing and putting into operation a coal mining curriculum?

33% Definitely Will ___ 47% Probably Will ___ 20% Don't know yet ___ Not at All

8. In your judgment, which topics in the conference do you feel should have received greater emphasis?

Examples of comments:

- The manual was very well presented. No one area needed greater emphasis.
- Setting up program.
- Examples of suggested curricula for southern Illinois schools.
- Funds to establish total program.

9. Which topics in the conference should have received less emphasis?

Statistics

General information--cut to 1/2 day

10. In order to improve other similar conferences, what changes or modifications in conference procedures would you advise (other than those noted in #8 and #9 above)?

11. Other Comments?

Thank you so much for doing a large amount of the work I anticipated for myself.

Informal is very desirable.

Very good.

12. In general, what is your rating for the quality of this conference?

53% Excellent ___ 47% Good ___ Fair ___ Poor

Following the end of the second workshop, display materials, films, etc. were moved to the East Central Curriculum Coordination Center at 100 North 1st Street, Springfield, Illinois where they are available for review and use by LEA personnel. Additional materials not chosen as part of the display sample were boxed and shipped from CONSERVA's offices directly to the Center.

A letter and a copy of the Manual were mailed to each individual who had sent an application indicating an intention of attending one of the two workshops but was unable to attend (see Appendix). The balance of the contract-specified number of copies of the Manual was shipped directly to the Department of Adult, Vocational and Technical Education.

The completion of this Final Report, in conjunction with the two previous coal mining-related projects provides a data base to assist in the planning of entry-level coal mining curricula. Vocational education curriculum planners in Illinois have been provided with (1) data on the current and future training needs for coal and gasification occupations in Illinois; (2) a competency-matched documentation of instructional resources for use in planning of coal mining curricula at the secondary level; (3) inservice training on procedures for use of project materials; and (4) access to a collection of coal mining instructional/training materials which should greatly simplify the process of obtaining appropriate curriculum materials for any competencies to be taught. These products and services are designed to assist local vocational educators in structuring curricula which are best suited to local needs and resources and should facilitate understanding of the vital role which vocational education can play in the preparation of youth for entry into the coal mining occupations of Illinois.

REFERENCES

Besterfield, D.H. "Midwest University Develops New Mining Program Geared to Boosting Production." Coal Age, November 1975, pp. 98-99.

Drewes, D.W. An Assessment of Employment and Training Needs for Coal and Gasification Occupations. Final Project Report, RDC-A7-268 for the Illinois Office of Education. Raleigh, NC: CONSERVA, Inc., 1977.

Energy and Power. Scientific American. San Francisco: Reprints from W. H. Freeman and Company, 1971.

Governor's Advisory Committee on Coal Manpower and the Illinois Basin Coal Mining Manpower Council. Final Report to the Governor on Manpower Needs of the Illinois Basin Coal Industry, December 1975.

Illinois Department of Mines and Minerals. The Coal Mining Act. Revised Edition. State of Illinois, September 1975.

Katz, D.S. and E.H. Oglesby. A Manual of Competency-Matched Instructional Materials for Developing Coal Mining Curricula. Springfield, IL: Illinois State Board of Education, Department of Adult, Vocational and Technical Education, 1979.

Malhotra, Ramesh and J.A. Simon. Illinois Coal: Development Potential. Illinois Mineral Note 65. Urbana, IL: Illinois State Geological Survey, November 1976.

National Coal Association. Coal Facts Information Folder. Washington, DC: NCA, 1978.

National Coal Association. The Power of Coal. Washington, DC: NCA, 1978.

Swalec, J.J. Involvement of a State Board in the Development and Implementation of Energy Related Technology Programs. Information Item No. 21. Springfield, IL: Illinois Community College Board, 1976.

"The Dangers of Counting on Coal." TIME, April 2, 1979, p. 66.

U.S. Bureau of Mines. Demonstrated Coal Reserves Base of the United States on January 1, 1974. U.S. Bureau of Mines Mineral Industry Surveys. Washington, DC: Government Printing Office, June, 1974.

U.S. Federal Energy Administration. 1977 National Energy Outlook. Washington, DC: FEA, January 15, 1977. (Draft).

U.S. Federal Power Commission. National Gas Survey, Vol. I. Washington, DC: Government Printing Office, 1975.

APPENDIX

Conserva, Inc.

SUITE 110-112 • 401 OBERLIN ROAD • RALEIGH, NORTH CAROLINA 27605
919/832-7717

March 27, 1979

Dear Local Vocational Director:

As you probably know, Illinois is rich with coal. The re-emerging of coal as one of the nation's most important energy reserves has important implications for vocational education. A recent study conducted for the Illinois Department of Adult, Vocational and Technical Education reported approximately 8,000 new workers will need to be added to the Illinois coal mining work force between 1976 and 1985 in order to meet increasing demands.

Yet despite this need, the State of Illinois offers no secondary level programs for the development of entry level coal mining skills. In contrast, neighboring states offer programs at both the secondary and post-secondary levels. Students at both levels are reportedly finding high paying jobs in the coal mining industry.

In view of this emerging opportunity, I am writing to invite you to attend a workshop on planning coal mining curricula. The workshop, sponsored by the Department of Adult, Vocational and Technical Education and conducted by CONSERVA, Inc., is designed to assist local vocational educators in assessing the feasibility of offering a coal program. The workshop will feature procedures for the use of a competency-based guide for the development of coal mining curricula. The guide along with additional information on instructional resources available from DAVTE will be provided to each participant.

In order to minimize travel time, workshops will be held on two occasions: in Mt. Vernon on May 14th, and in Springfield on May 15th. There is no charge to participants for attending either workshop. Each of the workshops will begin at 9:30 a.m. and end at 3:00 p.m. Since workshops are to be repeated, you need only attend one workshop.

In order for us to plan for the workshops, a registration card is enclosed. Please register as early as possible. Also enclosed is an outline of the topics to be presented at each of the workshops.

I hope that one of the workshop dates will be convenient for you. Should you have any questions regarding the workshops, please feel free to call me at (919) 832-7717.

Sincerely,

Douglas S. Katz
Vice President

DSK:bjt
Enclosures

WORKSHOP TOPICS

- The need for coal miners in Illinois
- The role which secondary level vocational education can play in preparing entry level miners
- Orientation to current coal mining processes
- Competencies of importance for entry level miners
- Planning a coal mining curriculum
- Overview of coal mining instructional resources available from DAVTE and other sources

GENERAL INFORMATION

Schedule:	9:30 a.m. to 3:00 p.m., with a break from 12:00-1:00
Locations:	Holiday Inn, Mt. Vernon, Illinois, Monday, May 14, 1979 I-57 and U.S. 460 Forum 30, Springfield, Illinois, Tuesday, May 15, 1979 100 East Adams
Fee:	None
Sponsoring Agency:	Illinois Department of Adult, Vocational and Technical Education
Workshop Conducted by:	CONSERVA, Inc. 401 Oberlin Road Suite 112 Raleigh, North Carolina 27605 Phone: (919) 832-7717

REGISTRATION FORM

Workshop On
DEVELOPING COAL MINING CURRICULA

NAME: _____

POSITION: _____

AGENCY: _____

ADDRESS: _____

CITY: _____ STATE: _____ ZIP: _____

TELEPHONE: Area Code ( ) - _____

I plan to attend the workshop held at (check one):

[ ] Holiday Inn, Mt. Vernon, Illinois, Monday, May 14th

[ ] Forum 30, Springfield, Illinois, Tuesday, May 15th

Please return your Registration Form by April 20, 1979 to:

CONSERVA, Inc.
401 Oberlin Road
Suite 112
Raleigh, North Carolina 27605

May 24, 1979

We are sorry that you were unable to join us for the recently held workshop on Developing Coal Mining Curricula at the secondary level in Illinois. A copy of the manual which was distributed and discussed at the workshop may be of interest to you.

The text explains how the lists of coal mining competencies were compiled and prioritized. The competency statements are then matched with instructional materials (texts, workbooks, films, etc.) providing resources for teaching of the individual competencies. A comprehensive listing of these materials including publisher or source, description, and cost (if any) is included as Table IV of the manual. A sample copy of any material marked in Table IV with a [•] is now available for your examination through the East Central Curriculum Management Center in Springfield.

Finally, a four-step procedure is presented for use of the manual in developing coal mining curricula which meet the needs of local conditions and priorities. The manual was developed, by contract stipulation, for underground coal mining, but response has been favorable for its use, with modifications, for surface mining curricula.

Additional copies of the manual will be available soon through the office of Mr. Charles Schickner, Department of Adult, Vocational and Technical Education, Research and Development Section, Illinois Office of Education (217) 782-4620.

Sincerely,

Joseph T. Nerden

Joseph T. Nerden

Elizabeth H. Oglesby

Elizabeth H. Oglesby
CONSERVA, Inc. Staff

JTN:EHO:bjt

Enclosure